



WELCOME TO THE WORLD OF CELLS!

Fundamental Unit of Life • Comprehensive Study Notes

1. WHAT IS A CELL? 🤔

- Just like a house is made of bricks, all living things are made of microscopic units called **Cells**.
- It is the **Basic Structural & Functional Unit of Life**.
- In Biology, a cell holds the same importance as an "atom" does in Physics!

2. TYPES OF ORGANISMS 🦠🐘

Feature	Unicellular (Single-Celled)	Multicellular (Many-Celled)
Cell Count	Made of only ONE cell.	Made of millions of cells.
Function	One cell does all work (eating, breathing).	Specialized cells for specific jobs.
Labor	No division of labour.	Clear Division of labour.
Lifespan	Very short.	Longer lifespan.
Examples	Amoeba, Bacteria, Yeast.	Humans, Plants, Fungi.

3. THE EPIC DISCOVERIES 📖🔍

- **Robert Hooke (1665)**: First discovered cells in a cork slice. Named them "Cells" (Latin 'cellula' = little room).
- **Leeuwenhoek (1674)**: Discovered first **free-living cells** in pond water.
- **Robert Brown (1831)**: Discovered the **Nucleus** (the brain of the cell).
- **J.E. Purkinje (1839)**: Coined the term **Protoplasm**.
- **Haeckel (1866)**: Stated the nucleus stores hereditary traits.

4. THE CELL THEORY

Formulated by **Schleiden (1838)** & **Schwann (1839)**.

Golden Rule by R. Virchow (1855): "Omnis cellula e cellula" – All new cells come from pre-existing cells.

- All organisms are made of cells.
- Cells are structural and functional units.
- Every organism starts life as a single cell.
- **Exception: Viruses** (they are non-cellular).

5. TOOLS TO SEE CELLS (Microscopes)

Light Microscope

- Uses sunlight/lamp & glass lenses.
- Magnifies 300x to 1500x.
- Sees living or dead things.

Electron Microscope

- Uses electron beams.
- Magnifies up to 500,000x!
- Needs vacuum; specimen must be dry.

6. IMPORTANT CELL TERMS

- **Protoplasm:** Nucleus + Cytoplasm.
- **DNA:** Deoxyribonucleic acid (genetic material).
- **Gene:** The unit of heredity.

7. PROKARYOTIC vs EUKARYOTIC

Prokaryotic Cells (Primitive)	Eukaryotic Cells (Advanced)
Small size (1-10 μm).	Larger size (5-100 μm).
No nuclear membrane (Nucleoid).	Well-defined Nucleus with membrane.
No membrane-bound organelles.	Has membrane-bound organelles.
Single chromosome.	More than one chromosome.

8. DIVISION OF LABOUR

Just like a factory, a cell has **Organelles** to divide work:

- **Ribosomes:** Protein synthesis.
- **Chloroplasts:** Food production.
- **Lysosomes:** Waste disposal.

9. SHAPES OF CELLS

- **Irregular:** Amoeba, WBCs.
- **Spindle-shaped:** Smooth muscles.
- **Elongated:** Nerve cells (to carry signals).
- **Discoidal:** Red Blood Cells (RBCs).

10. CELL SIZE & VOLUME

- **Smallest:** Mycoplasma (0.1 μm).
- **Largest:** Ostrich Egg (18 cm).
- **Longest (Human):** Nerve cell (up to 1 meter!).



Fun Fact: An elephant has more cells than a mouse, but their individual kidney cells are roughly the same size!